WORK STATUS REPORT

JS-516

Period: March 1 through April 30, 1967

[redacted]

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May 5, 1967

[redacted]

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INTRODUCTION

This progress report covers the period from 1 March through 30 April 1967. Four areas of effort are included:

I. Modification of Richards Viewer

II. Noah's Ark

III. Low Gamma Reversal Process

IV. Color Support

The financial information included in this report is for the entire contract period from 18 October 1966 through 31 March 1967.

I. MODIFICATION OF RICHARDS VIEWER

PROGRESS DURING THE PERIOD

The purpose of this project is to replace the glass platen on a Richards Model 940 viewer with an electrostatic hold-down platen and to evaluate the resulting instrument. The electrostatic panel is manufactured [redacted] STAT

After a visit to the [redacted] STAT [redacted] STAT in order to examine and discuss the electrostatic panel, it was concluded that the major problems in using the electrostatic panel will be in making the initial film-panel contact and in removing film. The panel does not attract the film so that the film must be smoothed onto the panel by hand or with a special brush. Turning off the electrical power does not cause the holding force to release so that the film must be pulled off the platen. Blowing ionized air across the film will aid this somewhat.

Some additional minor problems or disadvantages noted at the time of the Simco visit and demonstration are:

1. The film, after removal, has a static charge which will attract dust. There are however, methods for discharging the film.

2. Operators are subject to electrical shocks. We have been assured that there is no personnel danger but the shocks may be annoying. Operating procedures can be established which will eliminate these shocks.

3. If "static bars" are used to discharge the film or if ionized air is used, an ozone odor may be noticed. Once again we have been assured that the ozone level is low enough so that there is no personnel hazard but, at least to some people, it may be annoying. Good ventilation may eliminate this problem.

4. There is a 1-1/2 inch opaque border around the panel. This has reduced the viewing area to 8 x 37 inches.

On the plus side, the panel demonstrated [redacted] did hold the film flat, as expected, without the grooves or holes necessary with vacuum systems. STAT

The panel and auxiliary equipment were received on April 6, 1967. Unfortunately the panel was slightly oversize and would not directly replace the original glass panel. Rather than delay the program by returning the panel, we modified the viewer to the extent necessary to accommodate the panel. The modification is such that the viewer can be returned to its original condition very easily. This arrangement has permitted us to undertake our evaluation. If the results of the evaluation are favorable, a new panel should be obtained before the viewer is placed in actual use.

The evaluation of the electrostatic hold-down system at our facility has led to the following conclusions thus far:

1. The panel will hold single frames adequately. Removal of single frames, however, is difficult.

2. The panel will not hold film strips (2 to 3 feet in length for example), which have a tendency to curl after removal from the spool. If both film ends remain on spools, the film is held satisfactorily. We have repositioned the reels so that film on spools may be raised from the platen by a slight rotation of the reel.

3. It is necessary to smooth the film onto the panel either by hand or with the provided grounding brush. We have not, as yet, observed any film scratching as a result of using the brush but this has not been fully evaluated.

4. It is necessary to discharge the film in order to prevent its attracting dust after the film is removed from the panel. We have mounted "static bars" at each end of the table to discharge the film before winding on the spool. The adequacy of this has not yet been determined.

5. While discharging the film will prevent its attracting dust, it does not itself remove dust previously attracted to the film while it was on the panel. We are investigating the use of an ionized air blower to discharge the film and to remove dust. If this is satisfactory, the static bars discussed above can be eliminated.

6. The electrostatic panel has reduced the light level to about 30% of the level obtained with the original platen. Evenness of illumination has not been significantly affected. The light level available is still adequate for most film.

WORK PLANNED FOR NEXT PERIOD

The work planned for the next month will include the following items:

1. Determine if the grounding brush is scratching film.

2. Devise an adequate method for discharging the film and removing previously attracted dust.

3. Obtain comments, suggestions, criticisms, etc. from various staff members [redacted] with regard to the operating convenience, adequacy of hold-down, etc. while using the viewer. STAT

II. NOAH'S ARK

PROGRESS DURING THE PERIOD

The experimental design of the Noah's Ark program has been completed. Quotations on the power supply [redacted] the electroluminescent panel [redacted] and bromine cycle lamps [redacted] have been received and forwarded to the customer. STAT STAT

In a discussion with [redacted] at the time of his visit to [redacted] on 6 April 1967, consideration was given to the availability of two sets of 40 photographs to be presented to the photointerpreters in the Noah's Ark experiment. Obtaining the necessary photographs seems to be the only major problem at the present time. Also discussed were the general personality traits of photointerpreters and the fact that as a group they tend to be temperamental and uncooperative, thereby making it quite difficult to achieve valid experimental results. STAT

[redacted] also indicated that within the near future he [redacted] and the human factors engineers of the Boeing Aircraft Company would meet to discuss and correlate the work being accomplished on Noah's Ark with similar work being undertaken by Boeing. STAT STAT

WORK PLANNED FOR NEXT PERIOD

Meeting of the customer, [redacted] and Boeing personnel will be held to compare program plans in human factors area. A reworking of the present program is anticipated. STAT

III. LOW GAMMA REVERSAL PROCESS

PROGRESS DURING PERIOD

The program objectives call for the formulation of a black and white photographic developing process capable of producing gamma products of 2.0, 1.0 and 0.5 using camera negative emulsions such as Plus-X or Panchromatic-X. (The gamma product is the product of the negative gamma and reversal positive gamma.) Gamma products of 2.0 and 1.0 are not uncommon or are, at least, easily achievable. However, a gamma product of 0.5 is very difficult to obtain. Such a product requires negative gammas of 0.6 to 0.8 and positive gammas of .83 to .63. Our original proposal contained several alternative solutions to the problem. One approach employed alkyl mercaptans to effect the silver halide solubility in hypo. The process offered direct reversal in three steps with the potential of very low gamma. Another class of alternatives employed low gamma developers with a silver halide solvent bleach prior to reversal development, or combinations thereof.

Preliminary experimentation centered on developing a reversal process using alkyl mercaptans. In order for the process to work the camera emulsion must be bathed in the mercaptan solution, resulting in absorption on the silver halide grain. Exposure of the film results in chemical desorbtion of the mercaptan. Bathing the film in fixer removes the exposed silver halide. Subsequent processing, after light fog, in a developer produces a positive reversal. Various emulsions, both spectrally and non-spectrally sensitized, were used for the absorption study. Since we were unable to absorb the mercaptan on the grain surface, primarily because of the protection offered by gelatin, the process could not be applied successfully.

Our research efforts were then turned to a more conventional approach to the problem. We decided the next most feasible approach was development of a low gamma first developer, followed by a low energy go-to-completion developer. To date we have formulated a developer that is characterized by fine grain images of low gamma and long straight line portions of the D log E curve. With Plus-X emulsion and processing for 5 minutes at 70° F. a gamma of 0.65 was obtained. (Refer to the time vs gamma curves included herein.)

A suitable bleach has been formulated using an acidic ferro-ferricyanide complex. Some of the first reversals made were characterized by high D_{min} in the reversed image. Inclusion of a small amount of sodium thiosulfate in the first developer eliminated most of this problem by chemically "etching" the emulsion layer to the point at which only D_{max} in the negative was left in the layer. Consequently, upon reversal the D_{min} areas were void of silver halide capable of fogging and developing to any significant density.

WORK PLANNED FOR NEXT PERIOD

Although we have produced reversal gammas and gamma products of 0.5, as stated in the program objective, the process needs further work to eliminate mottle and the time dependence of the second developer step. The second developer will be formulated to act as a monobath, completion solution after which washing can be carried out. Work is also planned to obviate the need of reversal exposure by inclusion of a chemical foggant in the second developer.

IV. COLOR SUPPORT

PROGRESS DURING PERIOD

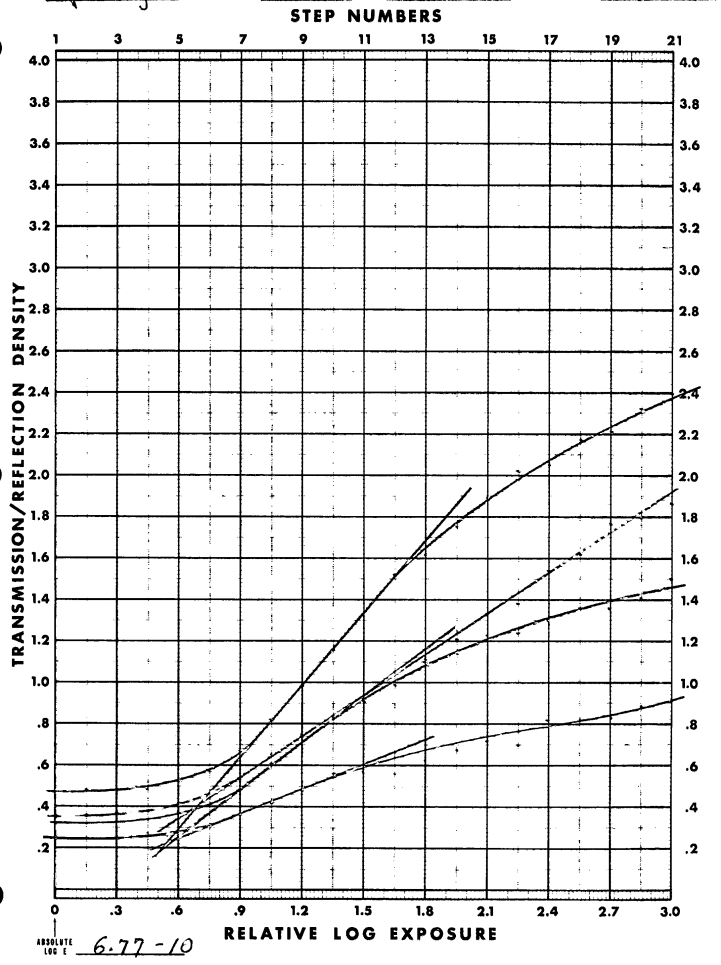
The search for a high resolution color film to meet customer needs has indicated that Scientia film from Gevaert is the most promising at present.

There were no specific requests from the customer to provide support in this area except to finish some of the illustrations for the color manual which have been delivered to the customer.

WORK PLANNED FOR NEXT PERIOD

A trip to Gevaert is planned to obtain further information on the Scientia film with respect to its availability, chemistry and processing facilities required.

Date April 14, 1967 Control # 20868 20869 Task _____ Prepared by R.W.B.



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Date March 11, 67 Control # _____ Task J5 516 P _____

Material Plus-X - 35 mm Mfr Eastman Kodak

Mfr/Exp Date _____ Coating/Emulsion # _____

Exposure Data

Instrument IB

Illuminant 2850 °K

Time 1/50

Intensity Modulator -15

Filters 78AA

MCS/Film Plane _____

Processing Data

Processor N Kor. Tank

Chemistry HP-4

Time(s) 1, 3, 5, 16 min

Temp (s) °F 20 ± 1

Agitation: Rate Continuous

Type Hand

Densitometry

Instrument TD-102

Type _____

Aperture Size _____

Filter (s) None

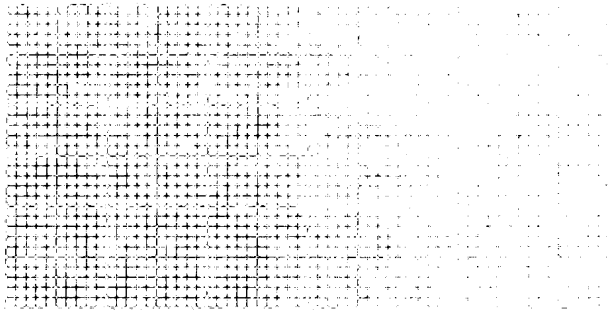
Sensitometric Properties

Speed ( ) _____

Gamma .41, .56, .66, 1.16

Base + Fog .24, .32, .34, .46

Analysis



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